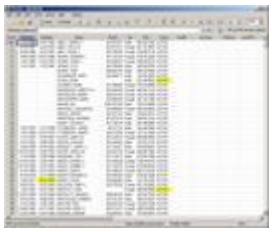
What's New ProVal®

ProVal version 2.27 December 2007

ProVal version 2.27 introduces new tools for **data editing and screening**, the ability to vary **mortality by pre/post-commencement,** the introduction of **core projection sample lives**, additional flexibility in **Canadian Solvency** assumptions**,** and **gain/loss analysis** for periods longer than a year. You'll find details about these and other enhancements below.

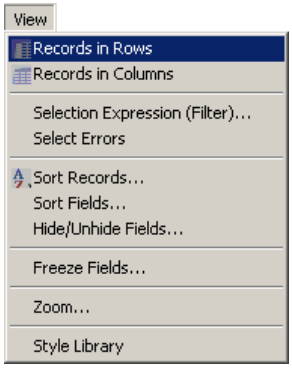
Census Data

- Spreadsheet Edit now lets you perform any database operation without leaving the data editor (e.g., import data, print data, frequency tables).



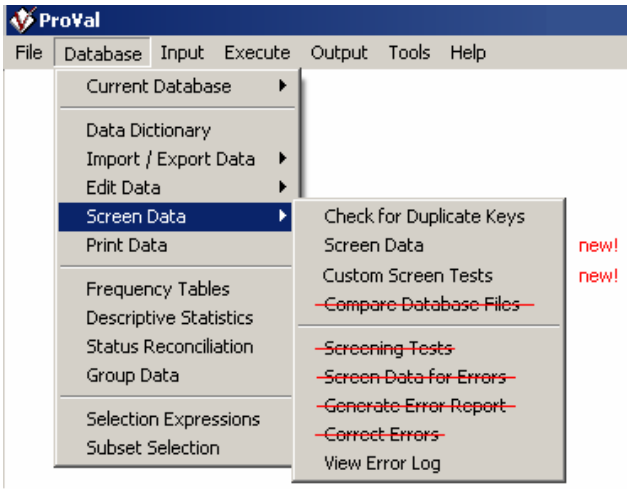
In addition, you can:

- Undo (and redo) manual edits
- Copy & paste (not just within ProVal, but also back and forth from Excel)
- Interactively add and delete records and fields
- Find specific values within a field
- View records in rows (for multiple records) or columns (for a single record)
- Sort records and fields, optionally freezing the first n fields (e.g., Name, SSN, and BirthDate).



- Easily save and load custom views from the style library.
- And more…

- Manual edits are now included in a database's change history, including before and after values (e.g., record #5's BirthDate changed from 1/1/1970 to 11/7/1980 by Jane Smith on …).
- A new Screen Data command finds potential errors and warnings in your data. A robust set of automatic checks are supplied along with the ability to create Custom Screening Tests. This renders obsolete the commands: Compare Database Files, Screening Tests, Screen Data for Errors, Generate Error Report, and Correct Errors.

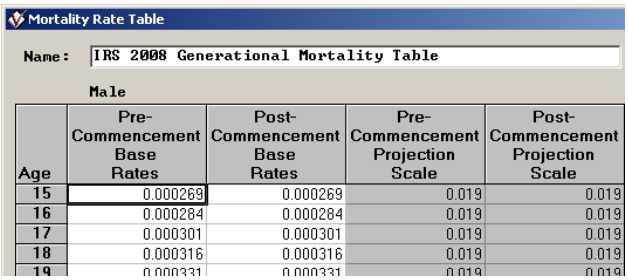


See Data Screening, page 6

- A new Condense Duplicates command lets you condense multiple records into a single record.

Mortality

- Pre/post-commencement mortality tables are now available. This is useful for proposed IRS 2008 mortality as well as 0 pre-commencement mortality.



Age	Pre-Commencement Base Rates	Post-Commencement Base Rates	Pre-Commencement Projection Scale	Post-Commencement Projection Scale
15	0.000269	0.000269	0.019	0.019
16	0.000284	0.000284	0.019	0.019
17	0.000301	0.000301	0.019	0.019
18	0.000316	0.000316	0.019	0.019
19	0.000331	0.000331	0.019	0.019

- Four new tables have been added to the Mortality Rates library.
  - IRS 2008 Static Mortality Table
  - IRS 2008 Generational Mortality Table
  - IRS 2008 Combined Static Mortality
  - UP-1994 Projected to 2015 with Projection Scale AA (useful for Canadian Solvency Liability)
- In Valuation and Projection Assumptions, active and inactive mortality can now vary by coded database field or calendar year, similar to the current functionality for other active decrements. Note that choosing <rates by calendar year> does *not* create an assumption change in a forecast.
- Age by Year of Birth mortality tables are now available. These are useful for generational mortality schemes which don't utilize a projection scale (as found in Germany, Belgium, France, etc.).

Canadian Registered Pension Plans

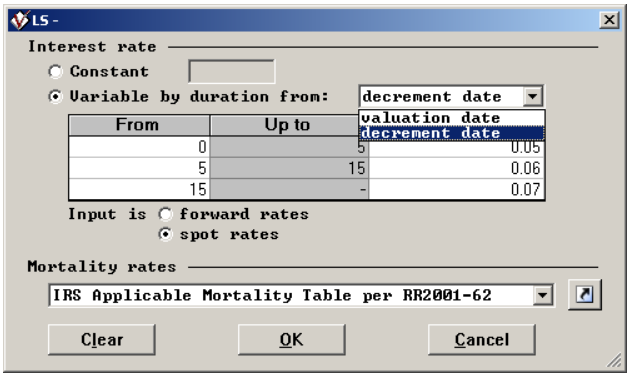
- For solvency liability calculations, you can now assume, in one run:
  - Transfer value interest that varies by duration (as opposed to by calendar year), eliminating the need for a workaround when forecasting.
  - Immediate and deferred annuity purchase interest rates (separate from the transfer value interest rate) for all inactives and actives older than a specified age.
  - Mortality rates for both transfer value and annuity purchase (separate from the funding assumption). For new valuation assumptions, solvency mortality defaults to "UP-1994 Projected to 2015 with Projection Scale AA" (see "Four New Tables…" above under "Mortality").
  - Zero pre-commencement mortality (using a pre/post-commencement mortality table – as described above under "Mortality").

See Canadian Solvency Liability, page 19

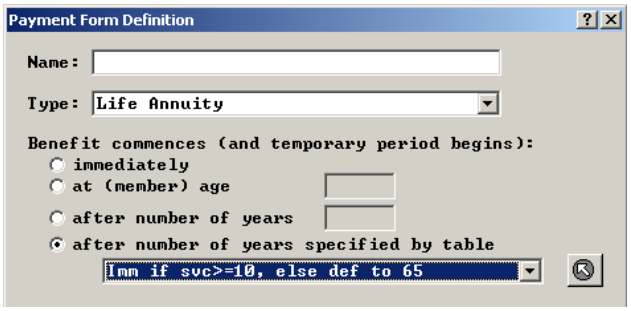
- Gain / Loss Analysis can now be run over multiple-year periods (e.g., 3 years). Please see "Gain / Loss Analysis" on page 4 for details.

Pension Plans

- The interest rate assumption for lump sum factors in valuation assumptions can now vary by duration from decrement (or by duration from valuation date, as before), and be input as either spot rates or forward rates.



- Deferral, temporary, and certain periods for active pension payment forms can now be specified by a table. For example, a benefit might be immediate (deferral period of 0) if a participant has at least 10 years of service, or otherwise be deferred to age 65 (deferral period of 65 minus age at decrement).



Forecasting

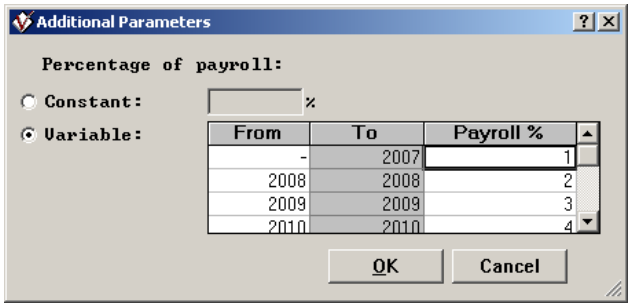
- Sample lives are now available in core projections, making it possible to check details about emerging inactives, new entrants, and plan amendments like never before.

See Core Projection Sample Lives, page 11

- A new #ENTRYYEAR benefit formula operator (and accrual basis operator) returns the year of entry for new entrants (e.g., 2010). This makes it possible to vary the benefit formula for new entrants hired before and after a future date, as in

```
#IF #ENTRYYEAR<2010 #THEN
  FinalAvgBft
#ELSE
  CashBal/LSFactor
#ENDIF
```

- The Efficient Frontier can now find mixes which optimize the excess return over PPA Target Liabilities.
- The "Percentage of Payroll" contribution policy in Asset & Funding Policies now allows a percentage that varies by calendar year.

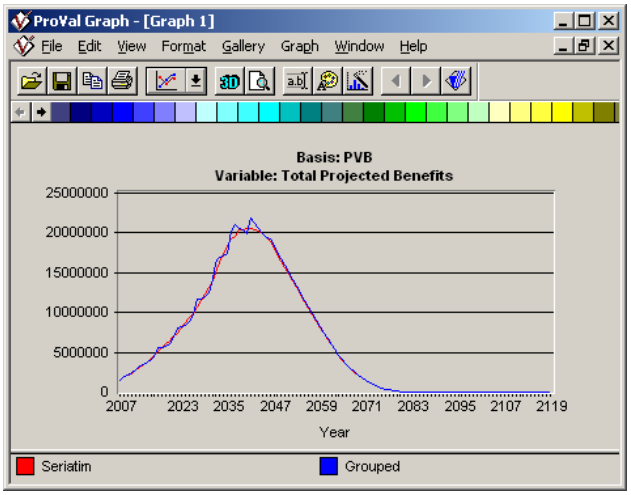


Sample Lives

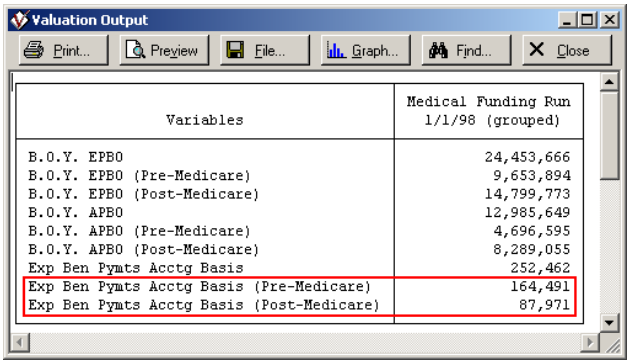
- In sample lives, you can now specify the maximum number of records to run (1-20). For example, setting this to 1 along with a selection expression of "`service>=30`" will run the first record with at least 30 years of service.
- A new Payment Form Value report is now available in pension modes (already available in OPEB mode).
- The Active Decrements report now includes the Not-at-Risk and At-Risk decrements that underlie PPA Target Liabilities, making it easy to see which retirement age is used for At-Risk assumptions.

Output & Reporting

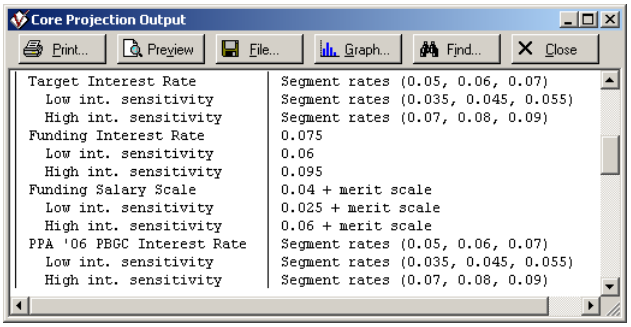
- Projected headcounts and benefits are now available in Valuation Output (previously only available in Execute > View). This allows for comparing runs, adding runs and graphing. For example, you might graph the projected benefits for a grouped valuation vs. a seriatim valuation to assess the fidelity of the data grouping.



- Pre/post Medicare splits are now available for expected benefit payments in valuation and core projection output.



- A summary of assumptions (i.e., inputs) for different sensitivities now appears in core projection output, making it easy to follow how each sensitivity is constructed.



- Vested target liabilities are now calculated for Form 5500.

Disclosure

- Two benefit payment overrides can now be specified in your Asset & Funding Policy: one for rolling liabilities forward to the measurement date and another for calculating the following year's expense. This facilitates calculating year-end disclosure values for plans with a

measurement date other than the beginning of the plan year.

Individual Results

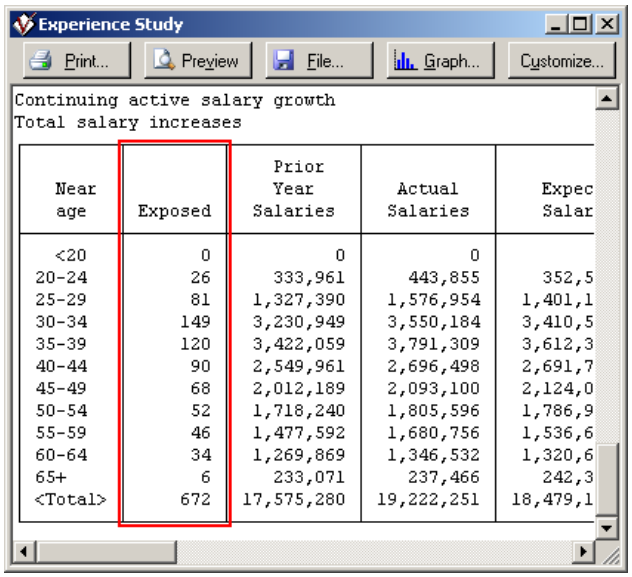
- A new individual result – Earliest Retirement Age – captures the age at which a participant first meets eligibility for any retirement benefit.

Gain / Loss Analysis

- Expected and actual benefit payments are now shown by status transition.
- Gain / Loss Analysis can now be run over multi-year periods (e.g., a 3 year period for triennial valuations) without requiring valuations in the intervening years. This is useful for Public and Canadian plans.
- The "non-participating statuses" topic in Gain / Loss Analysis has been reworked to make it simpler to understand

Experience Studies

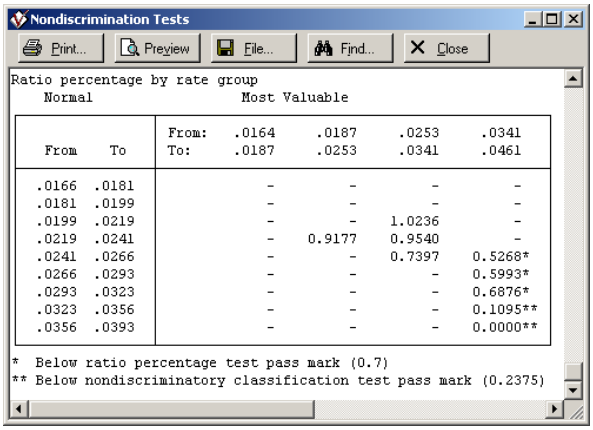
- The (exposed) headcount is now included when studying salary growth for continuing actives.



Near age	Exposed	Prior Year Salaries	Actual Salaries	Expec Salar
<20	0	0	0	
20-24	26	333,961	443,855	352,5
25-29	81	1,327,390	1,576,954	1,401,1
30-34	149	3,230,949	3,550,184	3,410,5
35-39	120	3,422,059	3,791,309	3,612,3
40-44	90	2,549,961	2,696,498	2,691,7
45-49	68	2,012,189	2,093,100	2,124,0
50-54	52	1,718,240	1,805,596	1,786,9
55-59	46	1,477,592	1,680,756	1,536,6
60-64	34	1,269,869	1,346,532	1,320,6
65+	6	233,071	237,466	242,3
<Total>	672	17,575,280	19,222,251	18,479,1

Nondiscrimination Testing

- Accrual Rates
  - For non-calendar plan years (e.g., year ending 6/30/2006), a new option lets you specify whether Social Security limits for calculating Covered Compensation and PIA are as of first day of the plan year (e.g., as of 7/01/2005) or the calculation date (e.g., as of 6/30/2006).
- Coverage and General Tests
  - In the "Ratio percentage by rate group" table, failing rate groups are now flagged to make them easy to spot. "*" marks those below the Ratio Percentage Test pass mark (generally 70%) and "**" marks those below the Nondiscriminatory Classification Test pass mark.



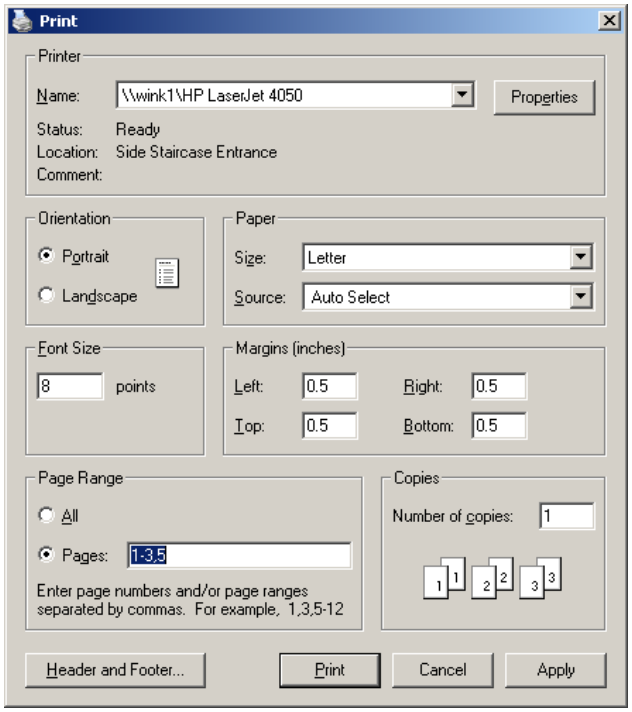
From	To	From: / To: .0164 / .0187	.0187 / .0253	.0253 / .0341	.0341 / .0461
.0166	.0181	-	-	-	-
.0181	.0199	-	-	-	-
.0199	.0219	-	-	1.0236	-
.0219	.0241	-	0.9177	0.9540	-
.0241	.0266	-	-	0.7397	0.5268*
.0266	.0293	-	-	-	0.5993*
.0293	.0323	-	-	-	0.6876*
.0323	.0356	-	-	-	0.1095**
.0356	.0393	-	-	-	0.0000**

* Below ratio percentage test pass mark (0.7)
** Below nondiscriminatory classification test pass mark (0.2375)

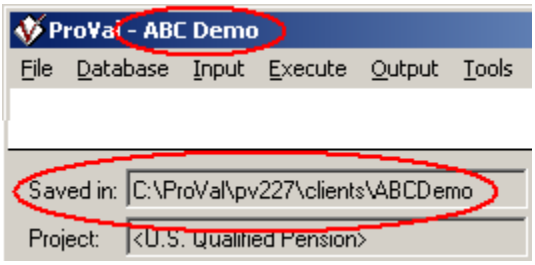
  - A new option lets you to treat negative accrual rates as zero (e.g., an integrated plan might produce artificially negative accrual rates for some participants when the integration level increases).
  - The adjusted normal and most valuable accrual rates are now available as individual results so you can see (and check) the effect of the permitted disparity adjustment.
  - The upper rate group can now be determined by looking at the maximum rate among HCEs, rather than all participants. If so, NHCEs with greater rates will be lumped together in one "overflow" rate group.

System

- You can now print selected pages (e.g., 1-3,5), rather than having to print out every page of a long listing. Also, you can now change the printer, orientation, paper, and copies without having to click the Setup… button.



- The client name (e.g., "ABC Demo") has been moved from the status bar (bottom of window) to the caption (top of window). In its place, the folder the client is saved in (e.g., "c:\...\abcdemo") now appears in the status bar. This makes it easier to see which client is open and will hopefully prevent accidentally working with the wrong copy of a client (e.g., c:\ vs. g:\).



- A checkmark on the Overrides button in valuation sets, deterministic forecasts, and stochastic forecasts, now makes it easy to see whether or not liability overrides have been applied.

- The ProVal installation procedure has been upgraded to:
  - Eliminate the need to manually install the "ProVal" font under Windows 2000.
  - Incorporate the sentinel driver installation, making it unnecessary to perform as a separate step.
  - Install shortcuts so that they are available to all users on a multi-user machine (e.g., under Windows XP).
- The Batch Server interface has been enhanced to include end-user reporting, grant administrative rights, and more…

  For more information, see "Batch Server Installation Guide.pdf" in the ProVal folder.

Changes Log

- Be sure to read the changes log (see What's New in Help or the CHANGES.LOG file in the ProVal directory) about updates to certain calculations that may change results.

New Member of the WinTech Team

Sue Kalman recently joined the WinTech team. Sue has used ProVal for nearly a dozen years and her testing skills are nothing short of legendary. Sue has 35 years of experience developing and testing in-house systems. She's also one of the nicest and most energetic people you'll ever meet.

WinTech's Virtual Back Office

Need help bringing up new clients, converting cases, or experienced help in a ProVal area that's new to you? Why not call upon WinTech's experienced actuaries to fill in? Contact **Hank Freeman** at (203) 861-5526 for details or to request a quote.

WinTech

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Data Screening

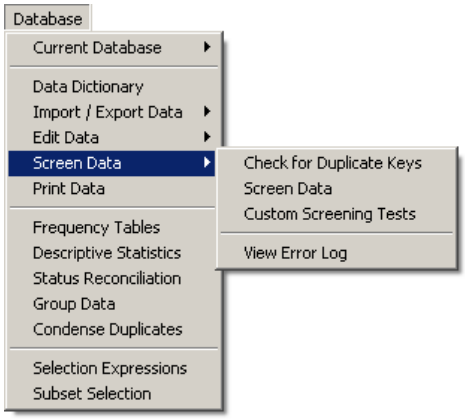
Ever since valuations became a commodity in the marketplace, efficiency has been the name of the game. To improve your efficiency, you can look for tasks that are responsible for a large percentage of a valuation's time charges and streamline them. Data processing is often such a task.

Taking a closer look, the typical data processing tasks are:

1. Import this year's data
2. Check some control totals (e.g., headcounts by status, total payroll)
3. Screen the data for validity, reasonability, and completeness
4. Default missing data and calculate valuation data

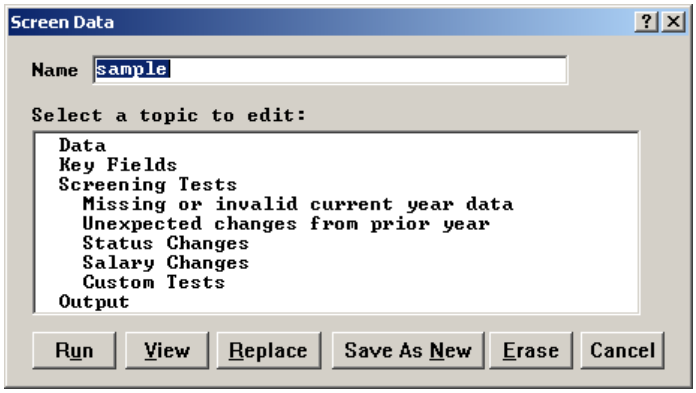
The real time sink – and opportunity – is item #3. ProVal's new data screening tools are designed to seize this opportunity. They put all the screening tools in one place and automate much of the process without losing the ability to customize it to your needs.

ProVal's data screening tools are available from the **Database > Screen Data** menu (or from within **Spreadsheet Edit** using the **Screen** menu).



The first step in screening data is to **Check for Duplicate Keys** (e.g., Social Security Numbers). Further screening steps presume that your data has unique keys. If you have duplicate records that need to be combined, try using the new Condense Duplicates command on the Database menu.

Once duplicate keys have been resolved, you're ready to **Screen Data.**



To get started, you'll need to provide the current year's (and, if available, the prior year's):

- Database
- Valuation date
- Census Specifications

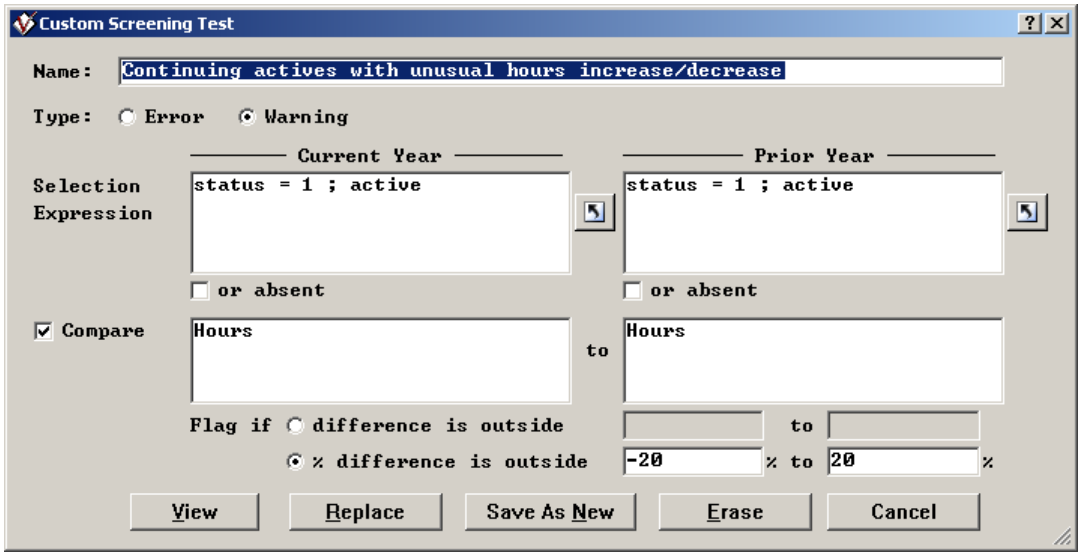
That, along with key field(s), is all that's needed to screen for:

- Missing or invalid current year data (similar to the tests that are run when validating a valuation)
- Unexpected changes from prior year
- Status changes (hint: start by pressing the "Populate" button)
- Salary changes

For completeness, we recommend that you also provide the current year's plan definition and valuation assumptions, but this is optional.

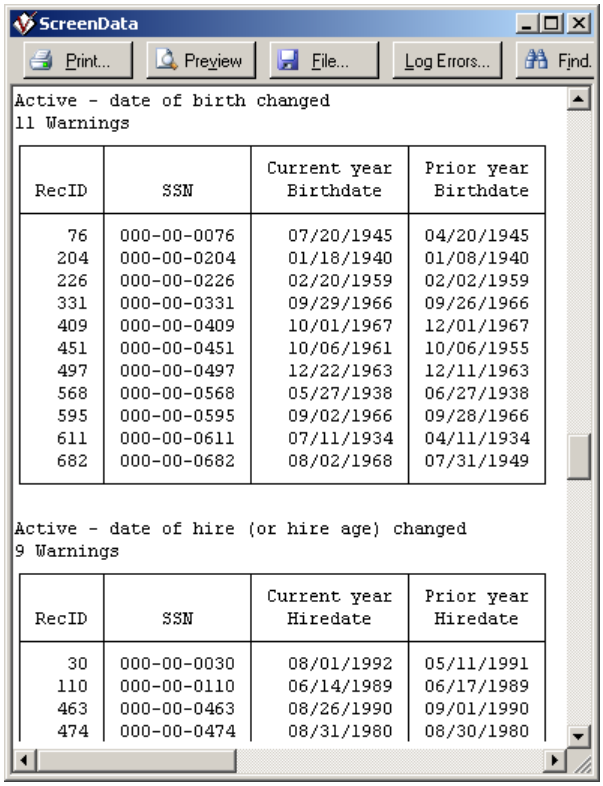
Tests which you don't want to run (e.g., because they are not applicable to your plan) can be turned off. In addition, all tests can be classified as either an error or warning; the distinction is purely for your use and has no intrinsic meaning to ProVal.

For client-specific situations, you can also set up **Custom Screening Tests**.



Custom screening tests combine the best of the "Compare Database Files" and "Screening Tests" commands found in previous versions of ProVal. You can specify selection expressions, refer to fields in both the current and prior year's databases, write complicated expressions, and save the tests for reuse later. Custom screening tests can be set up within the Screen Data or Custom Screening Tests commands, but are always run from the Screen Data command.

When you run the Screen Data command, it produces a summary of how many records failed each test and details for failed records. All of the data that was used in each test is displayed (e.g., the key field, current year's status, and prior year's status) along with additional output fields that you choose (e.g., Name). If desired, you can even customize the test descriptions. The report can be easily saved to Excel for further manipulation before sending to your client for resolution.



Errors and warnings identified by the Check for Duplicate Keys and Screen Data commands can be written to the database's error log by clicking **Log Errors** when viewing the output within these commands.

To work with errors and warnings using the **Spreadsheet Edit** command:

- Records with errors or warnings are highlighted with a yellow background. For example:

RecID	Age	Service
186	114.32	25.21
187	115.03	25.94
188	116.49	31.31

  All fields involved in a failed test are highlighted.

- On the **View** menu (within Spreadsheet Edit), click **Select Errors** to view only those records with errors or warnings. This sets the selection expression to "#ERRORS" and evaluates it.

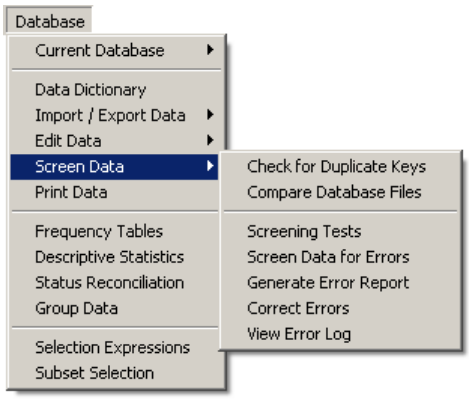
- To see one cell's errors and warnings, first select a cell. Then, on the **Screen** menu (within Spreadsheet Edit), click **Display errors for this cell.**

- To see all errors and warnings for the current database, click **View Error Log** on the **Screen** menu (within Spreadsheet Edit). From here, you can print the list or save it to Excel. You can also purge the error log of all or selected errors.

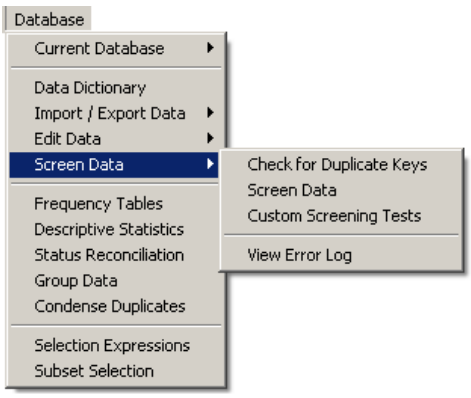
Transition from 2.26 to 2.27

The method for accomplishing many data screening tasks has been changed (for the better) in ProVal version 2.27. The most obvious change is that Database > Screen Data menu has been condensed.

ProVal 2.26



ProVal 2.27



If you used this command in ProVal 2.26	**Now use these commands in ProVal 2.27**
Compare Database Files	The Screen Data command has many built-in tests that you may have previously been using Compare Database Files for (e.g., checking to see if the date of birth changed, checking for illogical status changes, etc.). If the built-in tests are lacking anything, you can also set up Custom Screening Tests to compare values between the current year and a prior year database.
Screening Tests	The Custom Screening Tests library will be initialized with your previous Screening Tests. However, many of these tests should no longer be needed since they will be covered by the built-in tests found in the Screen Data command.
Screen Data for Errors	Custom Screening Tests are now run through the Screen Data command. The Screen Data for Error library entries from 2.26 will not be carried over to version 2.27 since most of the 2.26 Screening Tests they contained will now be covered by the built-in tests found in the Screen Data command.
Generate Error Report	The output of the Screen Data command is meant to replace Generate Error Report to a large degree. It includes some of the features of 2.26's Generate Error Report, including the ability to specify additional fields (e.g., Name and SSN) to appear in the listing. Further manipulations can be performed by saving the output to Excel.
Correct Errors	Use the Spreadsheet Edit command.

On a related note, the following Database > Edit Data commands have been retired in version 2.27.

If you used this command in ProVal 2.26	**Now use these commands in ProVal 2.27**
Copy Fields	You can create a copy of an existing field (except for character fields) by using Define Field by Expression. Alternatively, in Spreadsheet Edit, use Edit > Add Fields and then copy and paste values from the old field into the new one. To delete the existing field (an option in 2.26's Copy Fields command), use the Delete Fields command.
Individual Record Edit	Use the Spreadsheet Edit command with Records in Columns (on the View menu) to see all the data for a given record at a glance.

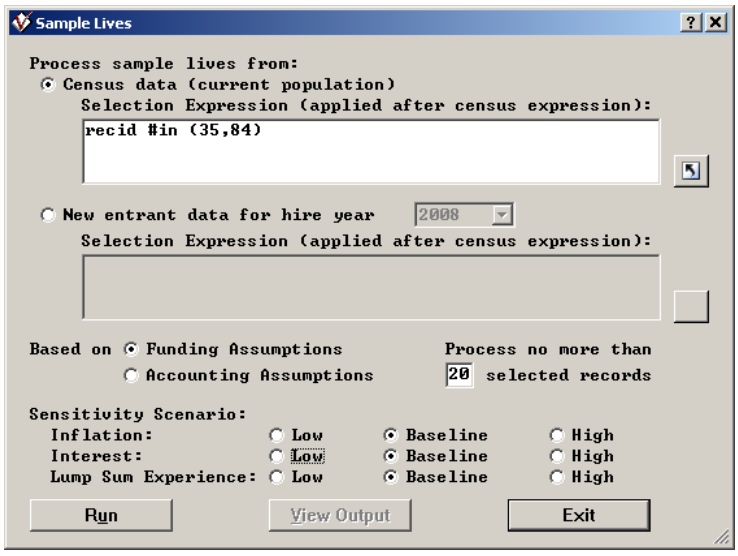
Finally, the following pre-2.27 commands have been renamed in version 2.27.

- Print Data has been renamed List Data. It has also been moved to Database > Import / Export Data.
- Create Fields has been renamed Add Fields.
- Erase Fields has been renamed Delete Fields.

Core Projection Sample Lives

With version 2.27, ProVal has the ability to display sample life results to help you verify your core projection results. In general, the sample life tables are directly comparable to those available for valuations, albeit with "historical" information and valuation assumptions consistent with the core projection sensitivity.

The initial core projection sample life dialog is comparable to valuations with respect to selecting records from the database and choosing the applicable valuation assumptions. Unique to core projections, the data can be selected from either the current or the new entrant database file. If from the latter, the year of hire must also be specified. In either case, a **selection expression** and the **process no more than x selected records** control can be used to control the records processed. Core projections also require specification of the desired **sensitivity scenario**, where the available choices are controlled by the Sensitivities button on the main Core Projection dialog.

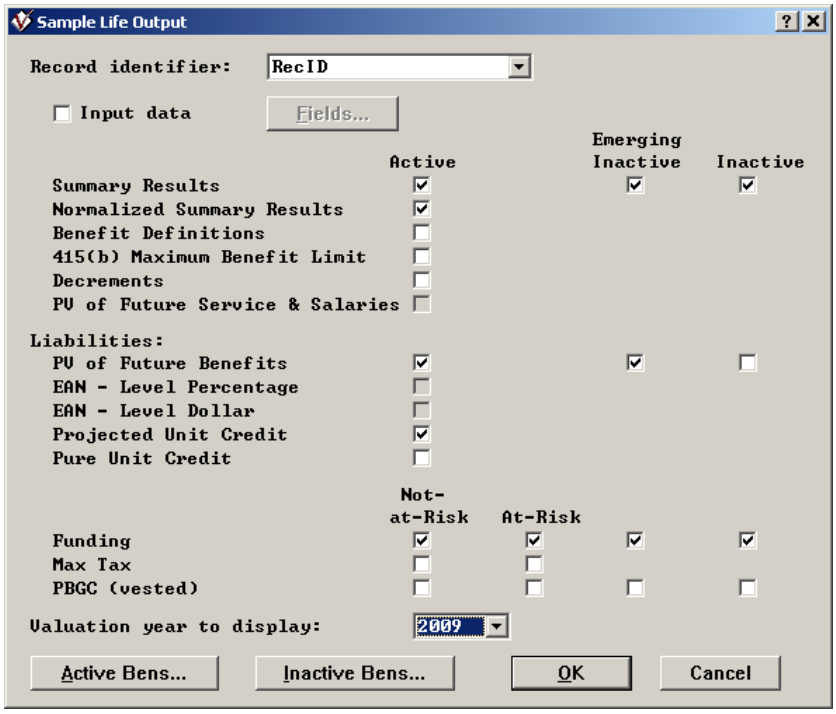


Once the sample lives have been run, the dialog of available choices is essentially the same as that for valuations except that there are a few extra choices:

- Most tables depend on the **valuation year to display**, so for them a year must be chosen. You will cycle through this dialog and the tables if you want to examine detailed results for more than one valuation year.

- The tables distinguish between initial actives, **emerging inactives** and initial inactives. Emerging inactive tables detail the inactive liability for participants that were active for the initial valuation year but then subsequently decremented and are inactive as of the "valuation year to display."

- There are two sets of active summary results tables: standard and "normalized." The standard summary results table is designed to match the core projection results you would see under the output menu if you ran a single record with no scaling factors. The results reflect the initial value of the Count field as well as the probability of survival to each future valuation date.



The **normalized summary results** for active participants ignore these two items; they show the results as if 100% of the person survived and remained active for each future valuation year. These normalized tables allow you to see the relative value of liabilities as the participant ages and their service and salary increases.

As an example, the illustrations below are the summary results and normalized summary results for a single active record with a count field value of 5.

Summary Results (Active)

RecID: 1

	2007	2008	2009	2010
Attained Age	32.08	33.08	34.08	35.08
Service from hire	11.43	12.43	13.43	14.43
Probability of remaining active	1.0000	0.9394	0.8825	0.8289
Number Active	5.0000	4.6971	4.4123	4.1446
Current salary	41,660	41,312	40,965	40,619
PV of Future (active) Benefits	38,029	40,732	43,594	46,623
PV of Salary	564,977	565,182	565,780	566,800
PV of Service	43	41	39	37
PV of Employee Contributions				
Active Liabilities (all benefits)				
Entry Age Normal (% salary)	23,020	25,745	28,620	31,653
Entry Age Normal (level dollar)	29,835	32,928	36,150	39,507
Projected Unit Credit	15,852	18,248	20,865	23,719
Pure Unit Credit	5,522	6,457	7,501	8,668
RPA '94	7,355	8,529	9,830	11,267
Gateway	7,355	8,529	9,830	11,267

Normalized Summary Results (Active)

RecID: 1

	2007	2008	2009	2010
Attained Age	32.08	33.08	34.08	35.08
Service from hire	11.43	12.43	13.43	14.43
Current salary	8,332	8,795	9,284	9,801
PV of Future (active) Benefits	7,606	8,672	9,880	11,249
PV of Salary	112,995	120,327	128,229	136,758
PV of Service	8.54	8.67	8.81	8.98
PV of Employee Contributions				
Active Liabilities (all benefits)				
Entry Age Normal (% salary)	4,604	5,481	6,486	7,637
Entry Age Normal (level dollar)	5,967	7,010	8,193	9,532
Projected Unit Credit	3,170	3,885	4,729	5,723
Pure Unit Credit	1,104	1,375	1,700	2,091

Most of the sample life tables depend on the **valuation year**. For example, the Benefit Definitions tables on the following page show the valuation year displayed after the record identifier. Here, the participant entered the plan in 1996, the initial valuation year was 2007 and, in the first illustration, we are now in 2010. All data shown through 2010 for the 2010 valuation year table is "experience data", and all data shown after 2010 reflects the valuation assumptions. As a comparison, the comparable table for the 2007 valuation year is also shown. All of the differences between the two tables are attributable to differences between valuation assumptions and projection experience for the 2007 through 2009 plan years (if any).

Benefit Definitions
Benefit: Ret - Retirement benefit

RecID: 1 <2010 Valuation Year>

Year	Age	Valuation Salary	ERF Component	BASE Component	EXCESS Component	Formula Benefit	Maximum Benefit	Projected Benefit
1996	21	4,594.70	0.620000	29.94	0.000000	18.56	459.47	18.56
1997	22	4,850.16	0.620000	98.86	0.000000	61.29	659.08	61.29
1998	23	5,119.83	0.620000	172.45	0.000000	106.92	1,149.64	106.92
1999	24	5,404.49	0.620000	250.11	0.000000	155.07	1,667.38	155.07
2000	25	5,704.98	0.620000	332.07	0.000000	205.88	2,272.57	205.88
2001	26	6,022.18	0.620000	418.57	0.000000	259.52	2,939.90	259.52
2002	27	6,357.01	0.620000	523.15	0.000000	324.35	3,674.41	324.35
2003	28	6,710.46	0.620000	638.06	0.000000	395.60	4,481.52	395.60
2004	29	7,083.57	0.620000	764.14	0.000000	473.77	5,367.01	473.77
2005	30	7,477.41	0.620000	902.26	0.000000	559.40	6,337.12	559.40
2006	31	7,893.16	0.620000	1,053.38	0.000000	653.09	7,090.48	653.09
2007	32	8,332.02	0.620000	1,218.51	0.000000	755.47	7,484.71	755.47
2008	33	8,626.14	0.620000	1,398.75	0.000000	867.22	7,900.86	867.22
2009	34	8,930.64	0.620000	1,588.44	0.000000	984.84	8,283.77	984.84
2010	35	9,245.89	0.620000	1,786.67	0.000000	1,107.73	8,629.60	1,107.73
2011	36	9,759.96	0.620000	1,992.33	0.000000	1,235.24	8,934.22	1,235.24
2012	37	10,302.62	0.620000	2,213.45	0.000000	1,372.34	9,312.16	1,372.34
2013	38	10,875.44	0.620000	2,451.21	0.000000	1,519.75	9,769.49	1,519.75

Benefit Definitions
Benefit: Ret - Retirement benefit

RecID: 1 <2007 Valuation Year>

Year	Age	Valuation Salary	ERF Component	BASE Component	EXCESS Component	Formula Benefit	Maximum Benefit	Projected Benefit
1996	21	4,594.70	0.620000	29.94	0.000000	18.56	459.47	18.56
1997	22	4,850.16	0.620000	98.86	0.000000	61.29	659.08	61.29
1998	23	5,119.83	0.620000	172.45	0.000000	106.92	1,149.64	106.92
1999	24	5,404.49	0.620000	250.11	0.000000	155.07	1,667.38	155.07
2000	25	5,704.98	0.620000	332.07	0.000000	205.88	2,272.57	205.88
2001	26	6,022.18	0.620000	418.57	0.000000	259.52	2,939.90	259.52
2002	27	6,357.01	0.620000	523.15	0.000000	324.35	3,674.41	324.35
2003	28	6,710.46	0.620000	638.06	0.000000	395.60	4,481.52	395.60
2004	29	7,083.57	0.620000	764.14	0.000000	473.77	5,367.01	473.77
2005	30	7,477.41	0.620000	902.26	0.000000	559.40	6,337.12	559.40
2006	31	7,893.16	0.620000	1,053.38	0.000000	653.09	7,090.48	653.09
2007	32	8,332.02	0.620000	1,218.51	0.000000	755.47	7,484.71	755.47
2008	33	8,795.28	0.620000	1,398.75	0.000000	867.22	7,900.86	867.22
2009	34	9,284.29	0.620000	1,595.26	0.000000	989.06	8,340.15	989.06
2010	35	9,800.50	0.620000	1,809.30	0.000000	1,121.77	8,803.86	1,121.77
2011	36	10,345.41	0.620000	2,042.22	0.000000	1,266.17	9,293.36	1,266.17
2012	37	10,920.61	0.620000	2,295.44	0.000000	1,423.17	9,810.07	1,423.17
2013	38	11,527.80	0.620000	2,570.50	0.000000	1,593.71	10,355.51	1,593.71

Decrements

For the initial valuation year, the decrements sample life table is identical to that shown for valuations. Specifically, it shows all valuation decrements beginning at entry age and continuing through the 100% retirement age. For later valuation years, the decrements sample life table shows experience through the current valuation year and then valuation assumptions thereafter, so it spans only the period from the initial valuation year through the 100% retirement age.

For example, in the table below, all decrement rates shown for years 2007 through 2009 are the experience decrements to which the participant was subjected. The rates shown starting at 2010 are the valuation decrements. There are also two columns unique to core projection sample lives (after the initial valuation year) which detail the experience survival probability to date and the experience survival discount.

Sample Life Output 1 of 1

Print... | Preview | File... | Util... | << Prev | Next >> | Find... | Close

Decrements

RecID: 2 <2010 Valuation Year, Actuarial Liability Decrements>

Year	Member Age	Service from Hire	Retirement Probability	Termination Probability	Death Probability	Disability Probability	Experience Survival Probability	Experience Survival Discount	Valuation Survival Probability	Member Survival Discount
2007	53	29	0.000000	0.002790	0.007117	0.000000	0.990093	1.000000		
2008	54	30	0.000000	0.001395	0.007801	0.000000	0.990805	0.990093		
2009	55	31	0.000000	0.000000	0.008519	0.000000	0.991481	0.980989		
2010	56	32	0.049835	0.000000	0.006453	0.000000		0.972632	0.943713	1.000000
2011	57	33	0.049822	0.000000	0.006961	0.000000			0.943218	0.943713
2012	58	34	0.049807	0.000000	0.007526	0.000000			0.942667	0.890127
2013	59	35	0.049790	0.000000	0.008174	0.000000			0.942035	0.839093
2014	60	36	0.049771	0.000000	0.008929	0.000000			0.941300	0.790455
2015	61	37	0.049748	0.000000	0.009812	0.000000			0.940439	0.744056
2016	62	38	0.099443	0.000000	0.010576	0.000000			0.889980	0.699739
2017	63	39	0.099380	0.000000	0.011771	0.000000			0.888848	0.622754
2018	64	40	0.099307	0.000000	0.013175	0.000000			0.887519	0.553534
2019	65	41	1.000000	0.000000	0.000000	0.000000			0.000000	0.491272

Note: Decrements prior to 2010 reflect experience. Decrements in 2010 and thereafter are valuation assumptions.

Liability Details

The sample life tables for the various liability methods are identical to the comparable valuation tables except, as shown below, for the addition of (1) identification of the valuation year and (2) adjustment of the calculation for the actual number of participants associated with the record. Thus the bulk of the table develops the liability as if the record represented a single whole person (as is typically the case for a valuation), and then the results are multiplied by the number of people that that record actually represents, at the specified valuation date, to get the final liability. An active liability table is shown below; the tables for inactive liabilities include comparable adjustments.

Sample Life Output 2 of 10

Print... | Preview | File... | Util... | << Prev | Next >> | Find... | Close

PV of Future Benefits (Active)
Benefit: Ret - Simple Test - 0 exp ben pmts

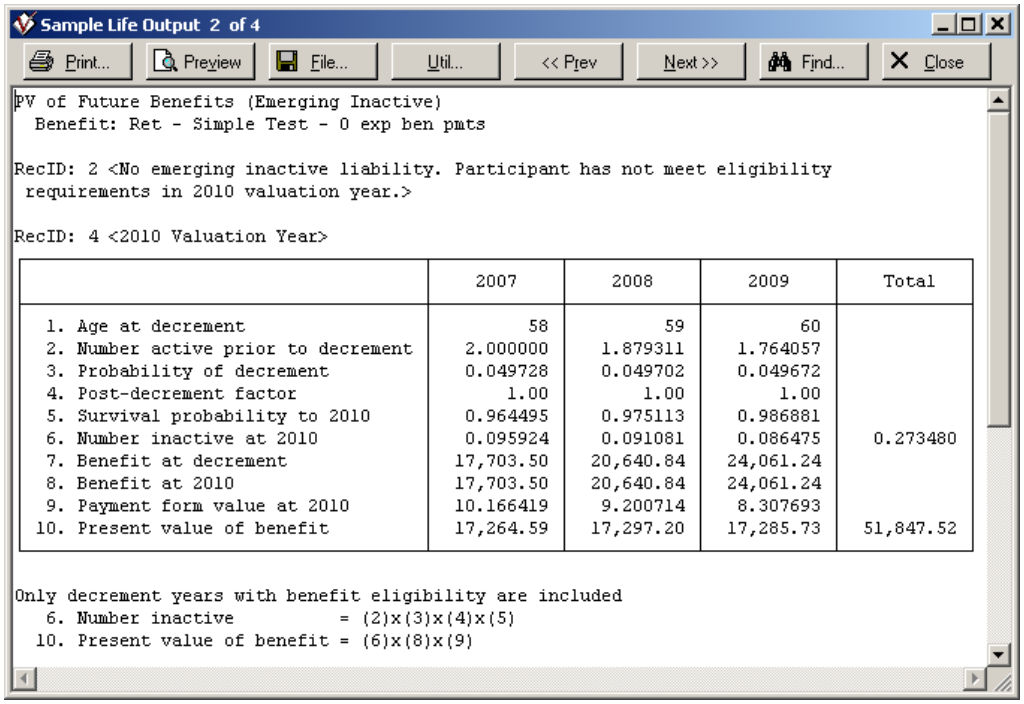
RecID: 2 <2010 Valuation Year>

Year	Member Age	Interest Discount	Member Survival Discount	Eligi-bility	Prob. of Decrement	Post-Decrement Factor	Payment Form Value	Projected Benefit	PV Benefits
2010	56	1.000000	1.000000	1	0.049835	1.000000	8.457392	17,107.53	7,210.32
2011	57	0.934579	0.943713	1	0.049822	1.000000	8.278080	20,314.97	7,389.57
2012	58	0.873439	0.890127	1	0.049807	1.000000	8.090945	23,973.77	7,511.22
2013	59	0.816298	0.839093	1	0.049790	1.000000	7.895905	28,099.71	7,566.73
2014	60	0.762895	0.790455	1	0.049771	1.000000	7.693094	32,608.22	7,529.17
2015	61	0.712986	0.744056	1	0.049748	1.000000	7.482846	37,492.02	7,404.08
2016	62	0.666342	0.699739	1	0.099443	1.000000	7.265675	42,080.33	14,176.34
2017	63	0.622750	0.622754	1	0.099380	1.000000	7.042332	45,981.49	12,480.46
2018	64	0.582009	0.553534	1	0.099307	1.000000	6.813749	50,151.09	10,932.47
2019	65	0.543934	0.491272	1	1.000000	1.000000	6.581030	54,610.61	96,036.98
Total									178,237.35
Number Active									0.97
Final Total									173,359.33

Emerging Inactives

The emerging inactive sample life tables for liability methods are quite different from anything available in valuations. No emerging inactive liability tables are available for the initial valuation year, by definition, because no actives have yet decremented. In later valuation years, a table will be available for each active benefit for each

participant who had met the eligibility requirements for a benefit during some valuation year prior to the year selected. In the example below, RecID #2 did not meet that criteria, so a message was produced rather than a table.



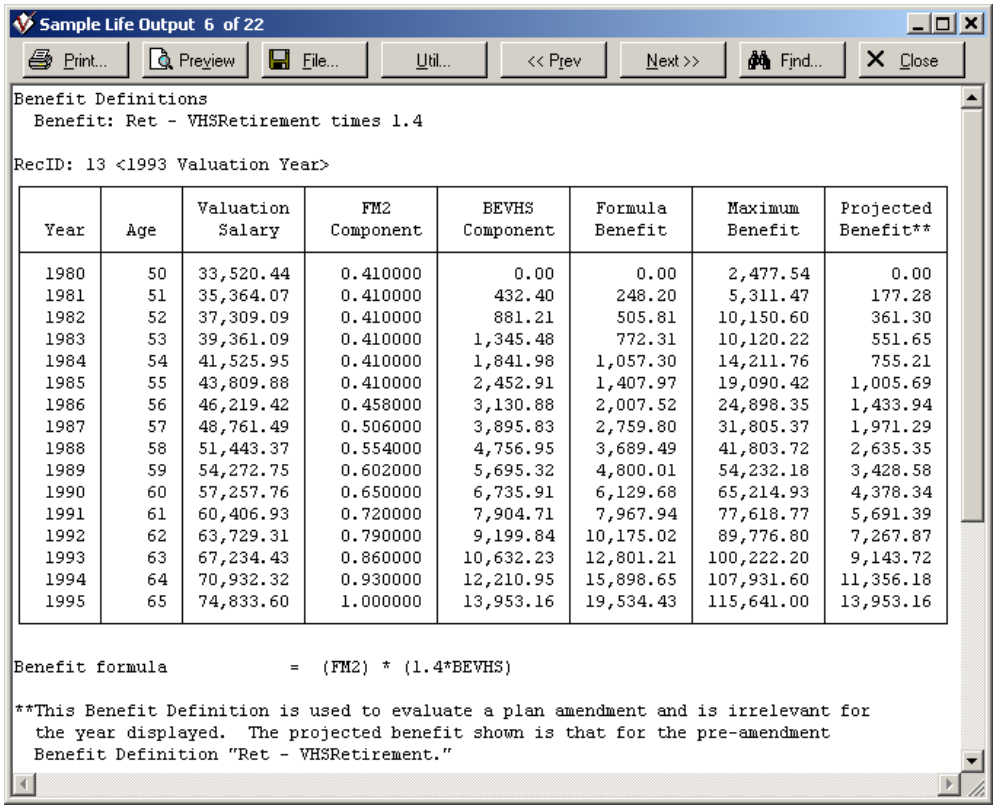
RecID #4, by contrast, was eligible for a benefit, and was assumed to partially decrement in each of the 2007 through 2009 valuation years, and each of those decrements contributed to the 2010 emerging inactive liability for the benefit in question. To detail this liability, the table generates the number of inactives and the liability amount as of 2010 associated with each past decrement, the total of which represents the total emerging inactive liability and the total inactive participant count associated with that benefit.

For example, RecID #4 had a count of 2 participants age 58 in the initial 2007 valuation year with a retirement decrement probability of 4.97%. Those decrementing actives had a 96.4% probability of surviving in inactive status to the 2010 valuation year, resulting in a total of .095924 inactives at 2010 from the 2007 retirement decrement for this record. At decrement, the benefit (verifiable from the Benefit Definitions sample life tables) was $17,703.50. Since there is a 0% COLA assumption and the benefit is still in payment status (i.e., it was not a lump sum or a temporary annuity where the temporary period has expired), the benefit in 2010 is still $17,703.50. The **payment form value** at the valuation year will typically be the same regardless of the year of decrement because it will typically be an immediate annuity. In this example, however, the benefit is paid as a 3-year deferred annuity, so the values differ reflecting the differing current deferral periods.

Note that these emerging inactive results can be verified by running a core projection with no new entrants and a single record. The inactive results, available under the Output > Core Projection Output command and detailed by inactive status code, should match the Total column of the emerging inactive sample life tables.

Plan Amendments

Plan amendments can come into play during a core projection and have been addressed in the sample lives. The information displayed depends on whether the valuation year is before, during or after the year of amendment. For example, the top illustration on the following page is an "amendment benefit", the Benefit Definition to which a Benefit Definition in the Plan Definition will be amended during the forecast, for a valuation year prior to the amendment. The **Projected Benefit** column is footnoted because it does not represent the results of the formula shown. Rather, it equals the value of the associated pre-amendment definition.



Benefit Definitions
Benefit: Ret - VHSRetirement times 1.4

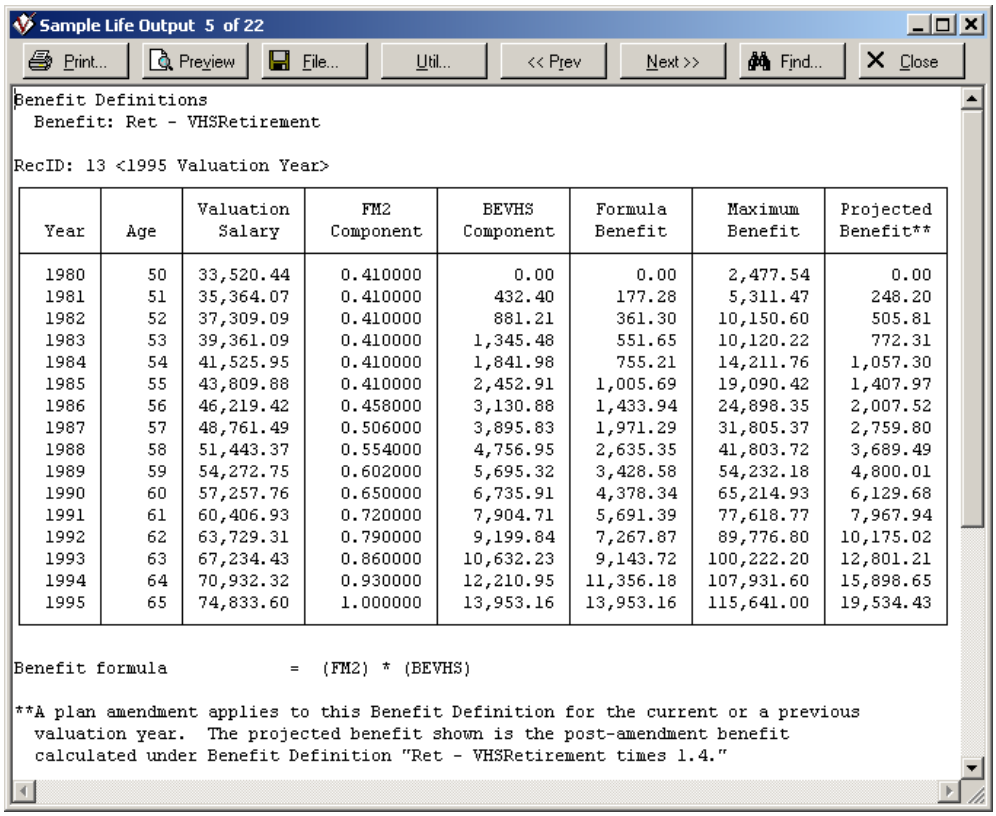
RecID: 13 <1993 Valuation Year>

Year	Age	Valuation Salary	FM2 Component	BEVHS Component	Formula Benefit	Maximum Benefit	Projected Benefit**
1980	50	33,520.44	0.410000	0.00	0.00	2,477.54	0.00
1981	51	35,364.07	0.410000	432.40	248.20	5,311.47	177.28
1982	52	37,309.09	0.410000	881.21	505.81	10,150.60	361.30
1983	53	39,361.09	0.410000	1,345.48	772.31	10,120.22	551.65
1984	54	41,525.95	0.410000	1,841.98	1,057.30	14,211.76	755.21
1985	55	43,809.88	0.410000	2,452.91	1,407.97	19,090.42	1,005.69
1986	56	46,219.42	0.458000	3,130.88	2,007.52	24,898.35	1,433.94
1987	57	48,761.49	0.506000	3,895.83	2,759.80	31,805.37	1,971.29
1988	58	51,443.37	0.554000	4,756.95	3,689.49	41,803.72	2,635.35
1989	59	54,272.75	0.602000	5,695.32	4,800.01	54,232.18	3,428.58
1990	60	57,257.76	0.650000	6,735.91	6,129.68	65,214.93	4,378.34
1991	61	60,406.93	0.720000	7,904.71	7,967.94	77,618.77	5,691.39
1992	62	63,729.31	0.790000	9,199.84	10,175.02	89,776.80	7,267.87
1993	63	67,234.43	0.860000	10,632.23	12,801.21	100,222.20	9,143.72
1994	64	70,932.32	0.930000	12,210.95	15,898.65	107,931.60	11,356.18
1995	65	74,833.60	1.000000	13,953.16	19,534.43	115,641.00	13,953.16

Benefit formula = (FM2) * (1.4*BEVHS)

**This Benefit Definition is used to evaluate a plan amendment and is irrelevant for the year displayed. The projected benefit shown is that for the pre-amendment Benefit Definition "Ret - VHSRetirement."

In the year of amendment, both the pre- and post-amendment Benefit Definitions will have their Projected Benefit column asterisked. In this year and all later years, the final projected benefit for the initial Benefit Definition will be coerced to reflect the post-amendment values. (The details of this calculation are available by looking at the amendment Benefit Definition.) The illustration below is of an original Benefit Definition on or after an amendment year.



Benefit Definitions
Benefit: Ret - VHSRetirement

RecID: 13 <1995 Valuation Year>

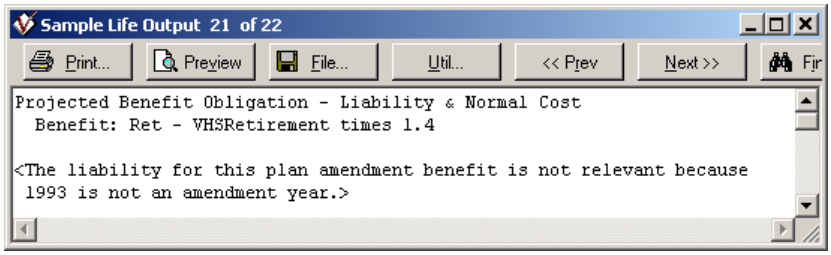
Year	Age	Valuation Salary	FM2 Component	BEVHS Component	Formula Benefit	Maximum Benefit	Projected Benefit**
1980	50	33,520.44	0.410000	0.00	0.00	2,477.54	0.00
1981	51	35,364.07	0.410000	432.40	177.28	5,311.47	248.20
1982	52	37,309.09	0.410000	881.21	361.30	10,150.60	505.81
1983	53	39,361.09	0.410000	1,345.48	551.65	10,120.22	772.31
1984	54	41,525.95	0.410000	1,841.98	755.21	14,211.76	1,057.30
1985	55	43,809.88	0.410000	2,452.91	1,005.69	19,090.42	1,407.97
1986	56	46,219.42	0.458000	3,130.88	1,433.94	24,898.35	2,007.52
1987	57	48,761.49	0.506000	3,895.83	1,971.29	31,805.37	2,759.80
1988	58	51,443.37	0.554000	4,756.95	2,635.35	41,803.72	3,689.49
1989	59	54,272.75	0.602000	5,695.32	3,428.58	54,232.18	4,800.01
1990	60	57,257.76	0.650000	6,735.91	4,378.34	65,214.93	6,129.68
1991	61	60,406.93	0.720000	7,904.71	5,691.39	77,618.77	7,967.94
1992	62	63,729.31	0.790000	9,199.84	7,267.87	89,776.80	10,175.02
1993	63	67,234.43	0.860000	10,632.23	9,143.72	100,222.20	12,801.21
1994	64	70,932.32	0.930000	12,210.95	11,356.18	107,931.60	15,898.65
1995	65	74,833.60	1.000000	13,953.16	13,953.16	115,641.00	19,534.43

Benefit formula = (FM2) * (BEVHS)

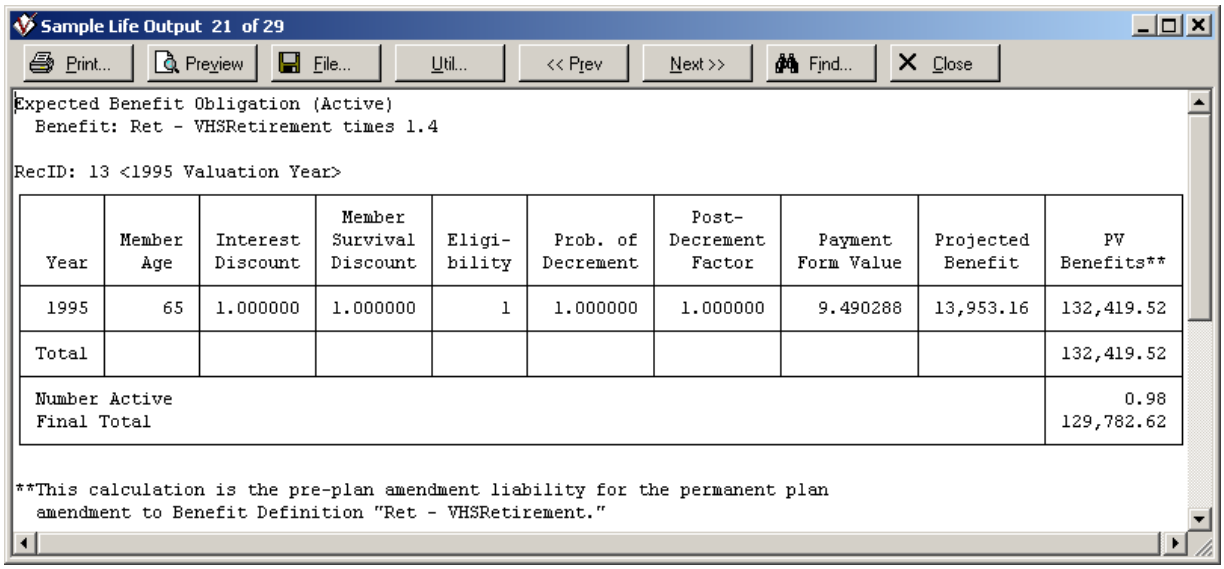
**A plan amendment applies to this Benefit Definition for the current or a previous valuation year. The projected benefit shown is the post-amendment benefit calculated under Benefit Definition "Ret - VHSRetirement times 1.4."

In the amendment year(s) only, the projected benefit column of the amendment benefit will be coerced to equal the pre-amendment benefit. The present value of this benefit will then be used in combination with the present value of the post-amendment benefit to determine the change in liability attributable to the amendment.

For liability calculations, the amendment Benefit Definitions are only relevant in the year of an amendment. In other years, a message such as that shown below will be displayed.



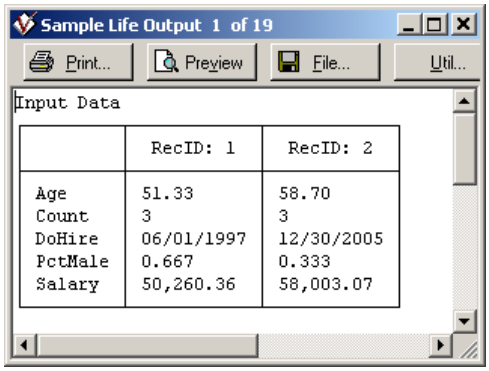
In the amendment year(s), the present value of benefits and/or liability will be calculated for the amendment Benefit Definition and asterisked as illustrated below. The projected benefit for this calculation (as noted on the Benefit Definition sample life table) is the pre-amendment benefit, so this calculation represents the pre-amendment liability.

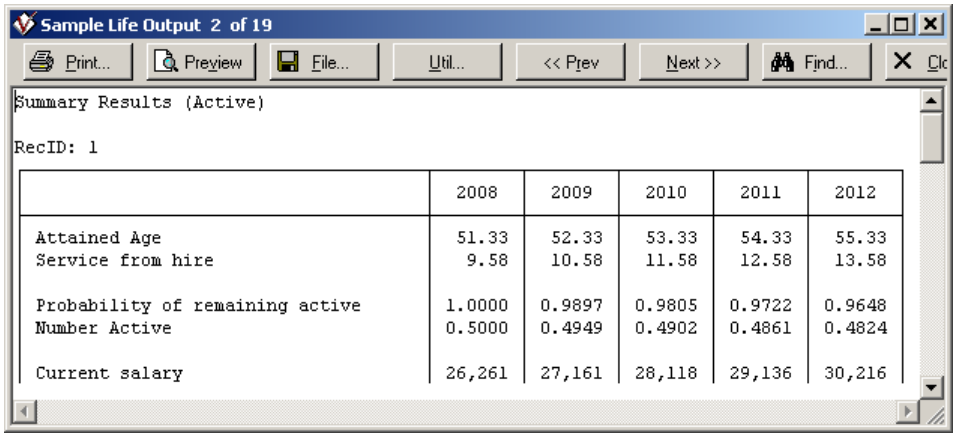


Year	Member Age	Interest Discount	Member Survival Discount	Eligi-bility	Prob. of Decrement	Post-Decrement Factor	Payment Form Value	Projected Benefit	PV Benefits**
1995	65	1.000000	1.000000	1	1.000000	1.000000	9.490288	13,953.16	132,419.52
Total									132,419.52
Number Active									0.98
Final Total									129,782.62

New Entrants

The sample life tables for new entrants are identical to those for initial actives except that they are only available for the period from the year of entry to the final valuation year. One item unique to new entrants that you can examine in these tables is the input data versus the age and salary of the new entrants as they enter during the forecast. You should note that the entry age for the new entrant remains constant regardless of the year of entry, and the salary at hire increases from the input data by the experience salary inflation assumption (but not the merit scale).





Note that it is not possible to display the "actual" number of new entrants for the forecast because that would require a complete forecast of the initial actives versus the population growth assumption to determine the number required new entrants each year, a process that is beyond the scope of the sample lives. Accordingly, regardless of the number of new entrant records selected in the selection expression, the total count for the sample lives will be "normalized" at 1. Thus, if the initial count field for each record is 1 and you run 2 records through the sample lives, each record will have a sample life count of 0.5. If you run three records with an initial count field of 1, each will have a count of 0.3333. If the initial count field is other than 1, such as 0.3 for a 25 year old and 0.1 for a 50 year old and these two records are both selected, the sample life count will be normalized per the count field to 1, so the count for the 25 year old will be 0.75 and the count for the 50 year old will be 0.25.

Available Tables

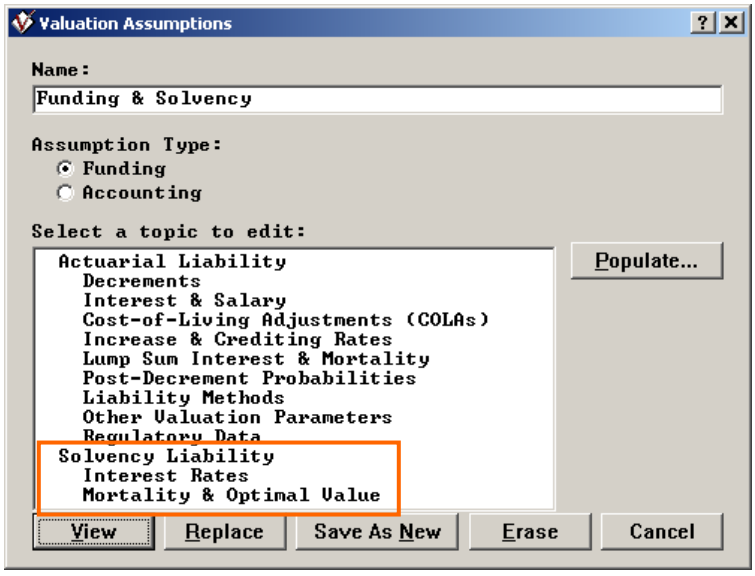
Generally speaking, all of the valuation sample life tables are available in core projections, plus there are some special core projection sample life tables for emerging inactives. There are some exceptions, however. For example, the pension payment form values and maximum current liability tables available for valuation sample lives are not (at least currently) available in core projection sample lives.

There are some other types of tables that we have thought of (and probably many that we have not thought of!) that seem desirable for core projection sample lives but are not currently available. One example is a table detailing experience benefit payments. Another example is a single table that develops the valuation salary for all valuation years. These tables will be added as time, competing priorities and user demand indicate.

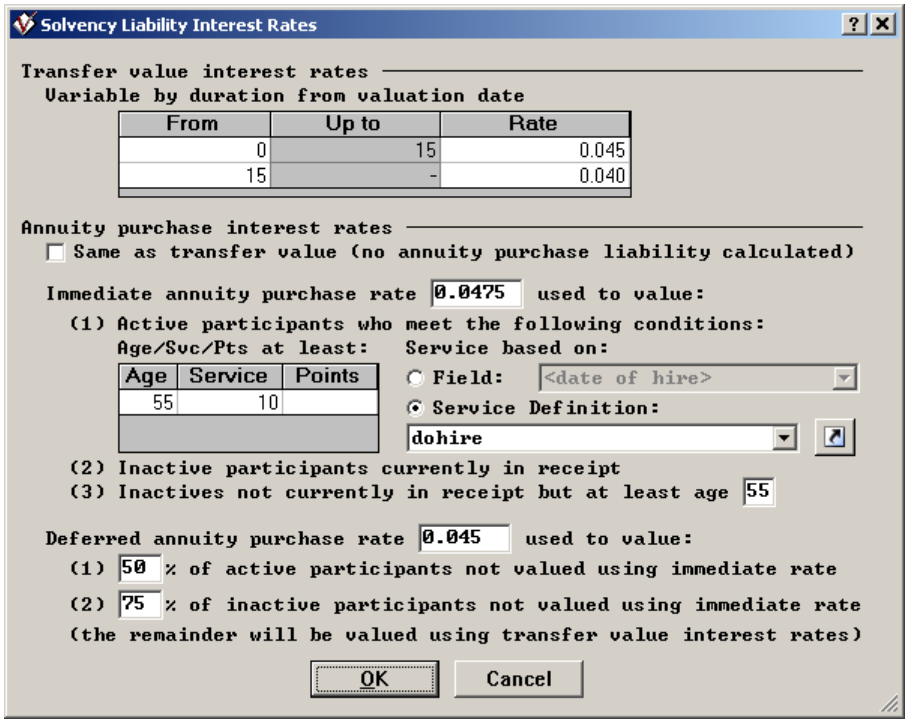
Canadian Solvency Liability

The Canadian mode solvency liability may now be split into two pieces: a "transfer value" (sometimes referred to outside of ProVal as "commuted value") portion and an "annuity purchase" portion. There are separate interest rates and, potentially, mortality assumptions for these two pieces of liability. The annuity purchase portion may be further refined by specifying a deferred annuity purchase interest rate different from the immediate annuity purchase interest rate.

To accommodate the enhanced solvency valuation assumptions, two new Solvency Liability subtopics have been introduced to replace the single Solvency Liability topic that existed previously: "Solvency Interest Rates" and "Mortality and Optimal Value".



The solvency liability may be calculated using solely the transfer value assumptions; or, alternatively, a separate annuity purchase liability may be calculated. This annuity purchase liability may have distinct interest rate assumptions for immediate and deferred annuities.



The transfer value interest rate assumption is variable by duration from the valuation date, and is input as forward rates. Typically there will be one rate for 15 years and another rate thereafter. The annuity purchase interest rates (if applicable) are entered as constants.

When annuity purchase interest rates differ from the transfer value rates, a separate **annuity purchase liability** is calculated. In this case:

- Active participants who meet conditions specified by the user (e.g. age 55) will be valued using the immediate annuity purchase interest rate. In the absence of a deferred annuity rate (see below), actives not meeting the eligibility conditions for the annuity purchase rate will be valued under the transfer value liability.
- Inactives currently in receipt of benefits will automatically be valued using the specified immediate annuity purchase interest rate assumption. A participant will be deemed to be "in receipt" if any of their benefits are annuities that have already commenced (or are about to commence). Decrementing actives are deemed to be in receipt when they are assumed to have decremented with an annuity.
- Inactives not currently in receipt will be valued using the immediate annuity purchase rate if they are over a user-specified age.
- Distinct assumptions for deferred versus immediate annuities may be specified.

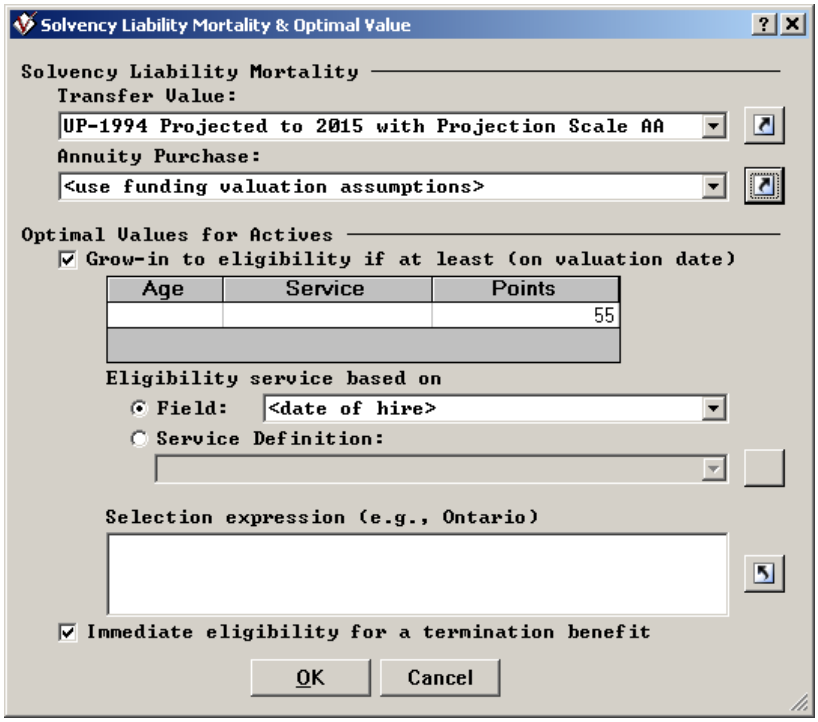
If a separate annuity purchase liability is calculated and a value other than 0% is entered for the active and/or inactive proportion of participants to be valued using a **deferred annuity purchase rate**, you will be able to enter a deferred annuity purchase rate distinct from the immediate annuity purchase rate. In this case:

- A user-specified percent (x) of active participants who do not meet the eligibility conditions specified for inclusion in the immediate annuity purchase calculation, will be valued using the deferred annuity purchase rate. The remaining (1-x)% of active participants not meeting the immediate annuity purchase conditions are valued using the transfer value assumptions.

- A user-specified percent (y) of inactive participants not in receipt and not over the specified age for inclusion in the immediate annuity purchase liability, will be valued using the deferred annuity purchase rate. The remaining (1-y)% of inactive participants not meeting the immediate annuity purchase conditions are valued using the transfer value assumptions.

On the Mortality and Optimal Value dialog, the annuity purchase and transfer value liability mortality assumptions are the same unless the user specifies otherwise. The default mortality table is the UP-1994 Projected to 2015 with Projection Scale AA, which is now a standard ProVal table. Note that the dialog no longer has a direct option for "zero pre-election mortality" because this valuation assumption can now be achieved within the Mortality Table Library, by defining a mortality table with distinct pre- and post-commencement mortality assumptions, where the pre-commencement assumptions are zero.

Other than the interest and mortality assumptions, the rest of the Solvency Liability calculation remains conceptually unchanged. Specifically, the optimal value age is calculated on an aggregate basis and applied uniformly to the three pieces (transfer value, immediate annuity and deferred annuity) of the liability.



Transition to New Structure

If you edit old valuation assumptions that have a calendar year solvency interest rate assumption, ProVal will make an attempt at converting to duration-based rates and produce a message that it did so. If you don't like ProVal's conversion, you may of course change it (or cancel).

Internally, ProVal considers any existing solvency liability results to be annuity purchase results and will display blank transfer value results. For new runs, if you do not specify distinct annuity purchase assumptions, then there will be a single liability and it will be considered a solvency transfer value liability. If you specify distinct annuity purchase assumptions, then your results will contain both transfer value and annuity purchase pieces of the liability and, as described below, you will be able to forecast your results using distinct interest rate assumptions.

Sample Lives

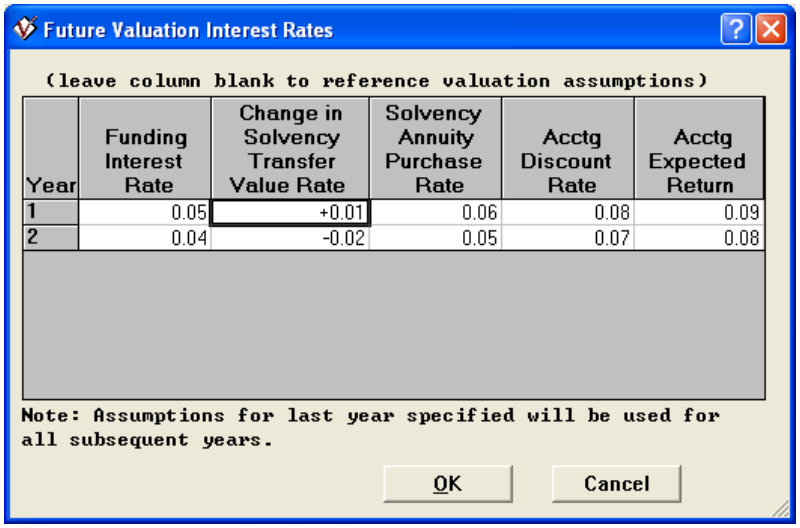
There is still only one "Solvency" checkbox, but within the sample life pop-up menu, there are now three sample life table choices for each benefit: transfer value, deferred annuity purchase, and immediate annuity purchase. The Optimal Value age asterisk will appear at the same age for all three tables.

Deterministic Forecasts

There are now two columns in Deterministic Assumptions to specify future valuation interest rates for the solvency liability: **Change in Solvency Transfer Value Rate** and **Solvency Annuity Purchase Rate**.

For the transfer value portion of the solvency liability, deterministic forecast interest rates are specified as deltas, or plus or minus changes from the baseline interest rate (i.e., forward rate) curve. This moves the entire interest rate curve up or down in a parallel fashion. Thus, for a typical assumption that breaks at 15 years, a specification of +0.01 increase both the pre- and post-15 year duration rate by 1%.

For the annuity purchase portion of the solvency liability, the deterministic forecast interest rates are specified as the desired immediate annuity purchase interest rate. The deferred annuity purchase rate, if applicable, is determined proportionate to the change in the immediate annuity rate.

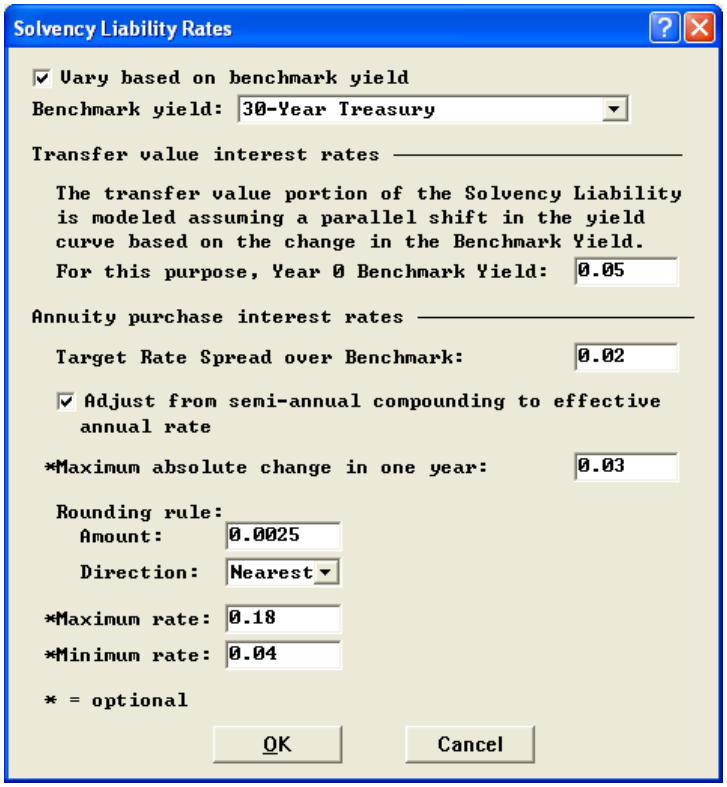


Stochastic Forecasts

Stochastic assumptions for the solvency liability are specified as shown below. If the assumptions vary during the forecast (as they should), the transfer value moves in a parallel fashion with changes in the specified benchmark yield, either a government or a corporate bond yield. For this calculation, a **year 0 benchmark yield** is required as the starting point and must be specified.

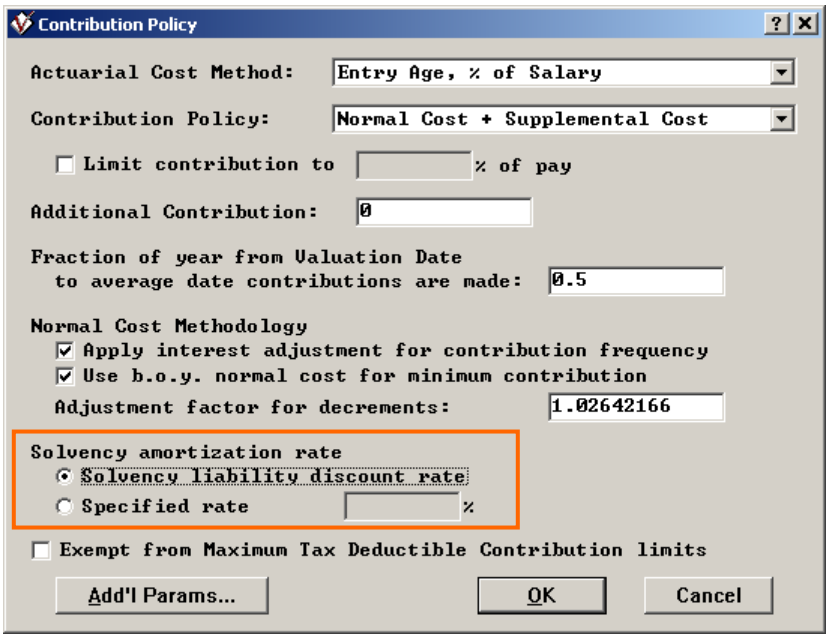
The annuity purchase interest rates also vary with the (same) specified benchmark yield, but in this case they are simply the simulated yield plus the specified **target rate spread over benchmark**.

The other parameters, which allow adjustment for semi-annual compounding, a maximum absolute change per year, rounding, and minimum and maximum rates, are unchanged from the prior version of ProVal.



Solvency Amortization Rate

For a Valuation Set or forecast calculations, the funding rules require a solvency interest rate to determine the solvency assets, which (generally) include the present value of any amortization payments scheduled for the 5-year period beginning with the valuation date. For this purpose, ProVal uses the solvency amortization rate specified in the Asset & Funding Policy, and appropriately adjusted during a forecast, if provided.



If a user-specified solvency amortization rate is not provided, the "solvency liability discount rate" is determined in accordance with the following rules:

- "Old runs", which, by definition, used either static or calendar year rates, are characterized by ProVal as annuity purchase only, so the annuity purchase rate (the only rate) is used.
- New runs that don't calculate a separate annuity purchase liability are characterized as transfer value only, so the transfer value rate (the only rate) is used.
- New runs that have both a transfer value liability and an annuity purchase liability use the transfer value rates as the solvency amortization rate.

Consistency Requirements in a Valuation Set or Forecast

If a user-specified solvency amortization rate is provided in the Asset & Funding Policy, then valuations may be combined in a Valuation Set irrespective of inconsistent solvency interest rate assumptions. For Valuation Sets for which a user-specified solvency amortization rate is not provided, "old runs" may not be mixed with new runs. That is, valuations using a duration-based interest rate assumption may not be combined with valuations having either calendar year or static interest rate assumptions.

For forecasts, all of the core projections must have the same solvency interest rate type, irrespective of whether a separate solvency amortization rate is specified. For a forecast, and also for a Valuation Set without a specified amortization rate, all of the interest rate assumptions must be consistent. Specifically, all of the transfer value interest rate assumptions must be the same, all of the immediate annuity purchase interest rate assumptions (if applicable) must be the same, and all of the deferred annuity purchase interest rate assumptions (if applicable) must be the same.